

## Relationship of Droughts in Nigeria to the World Climatic Variations

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### ABSTRACT

Droughts are periods of increased dryness due to perception falling far short that expected for a region. They occur in every type of climate, arid to humid, tropical to tundra and profound economic implications for many regions as crops fail and cattle die. This natural hazard is associated with world climatic variation of which little or nothing could be done to avert. This paper therefore, set at explaining the relationship with a prevailing situations in Nigeria with a view to advancing possible suggestions to migrate the threat posed by drought to humankind most especially in the agricultural sector of the economy. To this end, drought episodes – an historical perspective, drought aspect and Nigeria experience and drought causer factors and effects are addressed. Suggestions in solving the emerging environmental problems of drought are advanced.

**Keywords:** Climatic Variation, Drought, Nigeria, World.

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### 1. INTRODUCTION

Obviously several of the dominant cultures and religions of the modern world – Islam, Judaism and Christianity for example had their origin in the arid zone. Today, this zone is in many places the scene of active distress and even to tragic famine. In spite of the long tradition of human adaptation, many from the vanishing soil and natural resources. Particularly in Africa where the climate has recently been hostile, immense problems have arisen. Some areas are afflicted with consequent large-scale abandonment of previous fertile land. The best known is the so called Sahelian drought which is actually a period of progressive desiccation. That began more than two decades ago. Severe drought has also afflicted North-Eastern Brazil, Western China and Eastern Australia. Many of these episodes have caused humans suffering. For example, the absence of water in north-eastern Brazil in 1958 forced millions for people to abandon their homes to avoid starvation, (Daniel, 1980).

From one side of Africa to the other, rainfall was generally adequate or abundant in the 1950s, and 1960s at least until mid-century. Then, there began a desiccation brought about a decrease in rainfall that led to intense drought in 1972-73, and to continuing drought in the late 1970s and early 1980s in many areas, there have been disastrous drought in several years recently. The result has been the depletion or exhaustion of soil shallow groundwaters and intense pressure on farmers, herders and those with associated occupation.

The Sahelian drought once. Perceived as a severe event (1968-1973) in line with many present drought episodes, has turned out to be a prolonged desiccation that has brought tragic famine and dislocation to people and immense damage to African's ecosystem. (Daniel, 1980).

Other parts of Africa have seen severe drought during this period though few have seen such prolonged desiccation as Sahel. In Sudan and Ethiopia, the drought has in recent years affected quite thickly settled agricultural areas. Famine has ensued, leading massive hunger relief operations. Kenya, Tanzania, Malawi and Mozambique have suffered severally though intermittently. The area surrounding the Kalahari and the Savanah of Angola and Botswana have also been affected during part of the period has the pictorial land of South Africa and its enclaves, and Nigeria is not an exception. For instance, from Borno State through Bauchi, Kano, Kastina and Sokoto States, farmers who invested millions of naira during the 1990 cropping season watched helplessly as their crops, and in some cases livestock perished under the destructive effect of drought (Maina, 1990).

From the work of Hare (1985), it is obvious that many parts of the world have witnessed drought on one way of the other. For instance, in South America, the major stresses have been in north – eastern Brazil, where five of the past seven years were reported to have had below normal rainfall. This unique region with rainfall in the low-seen season, has a large population of cultivation and pastoralists with a high fertility rate. Drought has repeatedly stressed the regions food system precisely at a time when pressures were mounting due to the increase in population. Vigorous action by the Brazilian Government including resettlement programmes have not avoided great hardships.

Similar stresses have recently afflicted Western China and northern – west Indian, regions of Monsoon rainfall with high population densities. The Chinese Government has deep concern for the conservation of extensive loessic soils in the West, the product of millennia of airborne transport of dust and soil particles from arid inner Asia plateaux and basins. In Pakistan, the salinization of much irrigated land has been a major consideration because most agricultural depends on such land in the desert climate of the Indus-sutlej basin.

Australian has suffered a series of drought episodes in recent years. The great drought of 1972-73 was the culmination of prolonged desiccation in many years at Alice springs. For example, the general trend of rainfall was downward from 1997 until 1956 with renewed severe drought occurring in 1992. Heavy rains in 1973-74 in the east and the interior end of the episodes. Severe drought in many part, the worst on reccable, returned to eastern Australia in association with the great E1 Nino event of 1982-83.

It is quite glaring that in many parts of the world, recent climate history has included, protected and severe drought, that would have been hard for even undamaged ecosystem to deal with. In most of the areas discussed, the consequences have been very severe. The environment is under heavy pressure and the production of food, wood, fibre and water is ever – decreasing. Nowhere was this truer than in Africa.

## 2. DROUGHT ASPECTS AND THE NIGERIA EXPERIENCE

Drought is understood as a climatic event involving a shortage of rainfall sufficient to affect adversely crop and animal production, causing some ecological changes in affected areas. It is primarily a periodic natural event with subtle beginning and insidious progress, but its consequences can be significantly altered by man (NEST, 1991). Meanwhile, Adefolalu (1990) describes drought as the non-availability of adequate amount of water for man, animals and plants (growth, development and yield or maturity) as and when needed.

He, however, classified drought into two major categories viz: drought situation and drought condition. Drought situation has to do with break in rainfall, false cessation as short period of rainfall. Any period of rain break that is more than 20 days is usually referred to as drought and this is quite injurious to plant. When rainfall starts earlier than the normal period and then stopped abruptly, this situation is also termed drought. The last drought situation occurs when there is either late arrival of rainfall or early stoppage of rainfall giving rise to short period of rainfall (low rainfall) than what is expected

An example of drought situation in Nigeria is in 1990 when as a result of late arrival, uneven distribution as well as sudden cessation of rain, many farmers dreams in about five states in Nigeria – Sokoto, Borno, Kastina, kano and Bauchi were turned from humper harvest into nightmares, many of the farmers lamented in the affected areas about the abrupt cessation of the rains which had brought untold damages to their crops (Maina, 1990). Similarly, in Ekiti State this year when the usual August bake is being prolonged beyond the normal period of two weeks. It started around late July and ended early September. This has a very serious effect on the agricultural yield both on cash crops and food crops.

Drought condition on the other hand gives the details about the atmosphere over a period of time. Three types are identified viz: meteorological drought, agricultural drought and specifically to lower than normal rainfall amounts over a specific period of time. It is some climatological phenomena that relates to pattern of rainfall. In other worlds, it is concerned with the rainfall to Toure (1984), the normalized perception anomalies over the Sahel is obtained since the turn of this century.

Agricultural drought deals with insufficient soil moisture supplies at times of maximum demand due to either late onset of the rains or earlier than normal cessation dates of the rain or both. Two parameters are usually considered when describing soil moisture – evaporation and rainfall. Soil moisture is a function of rainfall and evaporation.  $R - ET / CP + S$ . Usually, there is water deficit in the soil when evaporation is greater than the amount of rainfall and vice versa (Italise). It is quite possible for an area to have surplus even when is has very little rainfall but lower evaporation. The best hydrological ration for crops according to Lamb (1982) is one. Anything short of this (hydrological condition) results to agricultural drought. Agricultural drought, however, is quite a problem in Nigeria, Particularly in the Northern parts of the country. According to Shulka (1985), certain areas especially, Bauchi, Borno, Gongola, Kano and Sokoto States have experienced shot or long duration of this type of drought.

Finally, hydrological drought relates closely to agricultural drought, but it is concern much with water. It is described as decline in underground water amount and hence lowering of the water table. It has to do with man's interference since it is very impossible if not in the desert that water table will fall below the normal rate without men's interruption. Meanwhile, a drawn – down as this effect is often called is postulated to be due to combination of prolonged "tapping" by man with simultaneous aggravating effects of meteorological and agricultural drought (Adefolalu, 1990). A good example of this is the case of lake Chad, in the heart of the Sahel which is now a mere shadow of its old size at 2,300 – 2,500km<sup>2</sup> as compared to the pre 1969/1973 drought area/surface of about 23 – 25,00km<sup>2</sup> (Shulka, 1985).

### 3. DROUGHT CAUSER FACTORS

Climate/rainfall variability has been a major factor in the occurrence of drought. According to Hare (1975), climate is the generalization of atmospheric behaviour over a period longer than a few weeks. Although, authorities would indeed say longer than a few years. In reality, climate consist of an endless succession of individual weather states. Severe drought occurs in the Sahel at southern margin of the Sahara when moist monsoon air failed to perpetrate sufficiently for northward from the tropical Atlantic. However, Toure (1984 stated that anomalies in the wind troposphere/stratospheric patterns are noticed during low southern Oscillation Index (SOI) indices. The ITCZ (Position/slope) jets easterly – waves (generation, intensity), squallines (formation number) directly influence the perception rate. According to Moura (1985), the Atlantic Ocean has a strong influence on the climate and intramural rainfall variability in NE Brazil. The atmospheric circulation anomalies associated with droughts or very wet years in and anticyclone variety deviations. The lag between the atmosphere deviation and the rainfall anomalies found to be of three to four months, thus showing predictive value.

Ma's interference with the balance of nature is inadequately altering the delicate balance of the present climate (SIMIC, 1971). The alteration in the balance has been resulting to drought which is now an inevitable part of the climate of arid and general environmental misuses have often been aiding desert like conditions in many parts of the world. In general, land use in our arid and semi-arid areas appears to have entered upon a vicious cycle of misuse. Soil and vegetation resources are over exploited resulting in depletion of soil fertility and tree cover. Compounding the consequences of man's bad management of his land resources is periodic drought which now and again intervene negatively in the cycle of attempt to extract more and more from a deteriorating environment. The consequences is a looming disaster for man and his environment.

According to Adefolalu (1990), man's interference with the environment is directly linked to increase albedo values either on local, regional or global scales. The consequence of increased albedo is a direct reduction in the effective heating power of the sun which lowers convention and as well as precipitation. In his own contribution, Charney (1976) reflects that the radiative heat loss caused by highly albedo of a desert contribute significantly to the sinking and drying of the air aloft and therefore to the reduction of precipitation. He equally opined that lack of evaporation caused by large changes in plants cover can be just as great an influence in prolonging a dry provide.

### 4. CONCLUSION

Drought as an inevitable part of climate can occur in any climatic region. Any significant reduction in the amount of rainfall normally received in an area can have a devastating effect on the rural economy comparable to the effect of drought in a semi-arid environment. For instance, drought has occurred in Southern Nigeria and has had catastrophic effects on the people in the past, and even in the present. The famine of 1945 (known as Iyan foworemi literally the famine of using money to purchase life) is a good example. The Sudano – Sahelian regions of Nigeria are the most vulnerable arears to drought and desertification processes. These regions already have low biological productivity, organic matter and aggregate stability. Their vegetation and plant covers are relatively sparse, and soils are relatively more susceptible to accelerated erosion by water and wind. People at risk and at loss in the Sudano – Sahelian regions are more than 19million and 17million respectively. In Yobe State alone, the drought that occurred resulted in the loss of about 3,142 metric tons of expected harvest (Abubakar and Yamuda, 2003)

## 5. RECOMMENDATIONS

Although, drought is a natural phenomenon, the occurrence of which cannot be wholly forestalled. It had only been verified by experts, that its incidence and harmful effects could be effectively mitigated through a properly programmed multi-direction strategy. To advise an economy that is in harmony with nature requires more than technological fixes. Land use control is the key to maintain healthy and productive microclimates, ecosystem and food production. Applied climatology and ecology go hand in hand with agricultural science and technology, and with forestry practice in seeking this harmony.

Consequently, the future role of the meteorologist in drought – prone – zone must hence be to collaborate closely with scientists working in these domains. Useful results will be achieved only if at the same time, both social and economic affairs in the countries at risk are in good hands. The political leaders of the affected countries can be sure that meteorologists can and will offer technical guidance to help restore properly to the drought prone zones.

The following areas of research are hereby suggested to enhance efforts made by various organizations of concern. There are: -

- (a) Scientific research should be chanced through the future study of the hydrological implication of drought and desertification and operative hydrology in different climatic regions;
- (b) Future research should also be oriented towards meteorological aspects of certain processes affecting soil degradation especially drought and flood;
- (c) There should be research on land use and agricultural management systems under severe climatic conditions, and
- (d) Finally, many subjects must be considered relating to climate variability and change, and their impact on human activities and even the structure of the society are so varied that new interdisciplinary as well as international approaches must be sought. The result must be applicable to decision-makers at all levels, from the individual; farmer to the designers of dams to the planners of world-wide energy strategy.

## REFERENCES

1. Abubakar, L.U & Yamuda, M.A. (2013). Recurrence of drought in Nigeria, causes, effects and mitigation. *International Journal of Agriculture and Food Science Technology*. 4(3), 169-180
2. Adedolalu, D.O. (1990): Desertification studies (with emphasis on Nigeria). In Vaughan, R.A. (ed). *Microwave Remote Sensing for Oceanographic and Marine Weather – Forecast Models*. Pp. 76-98. Netherland, Kluwer Academic Publisher.
3. Charney, J., Stone, P.H., & Quirk, W.J. (1976). Drought in the Sahara: Insufficient biogeographical feedback. *Science*, 191(4222) DOI:10.1126/science.191.4222.100b
4. Hare, K.F. (1979). Climate variation and variability: Empirical Evidence from meteorological and other sources. *WMO on Climate and Mankind*. 537, 51-87
5. Hare, K.F. (1985) Climate variation, drought and desertification. *World Meteorological Organization*. 846, 61-76
6. Hora, S.G (1952). Hora's sapera hypothesis: An aspect of Indian biogeography. *Current Science*. 19, 364-370.
7. Lamb, P.J. (1982). Persistence of Sub-Saharan drought nature. *World Climate Research Programme*. 299, 46-48.

8. Maina, S.M. (1990). Combating the drought menace. *New Nigeria*. 16, 12- 13
9. Moura, D.A (1985). Northeast Brazil drought and Atlantic SST. anomalies. *World Climate Research Programmes*. 4
10. NEST (1991) *Nigeria's Threatened Environment. A National Profile*. 23, 16-18.
11. Shulka, U.C. (1985). Drought causes and strategies to overcome its effects in Nigeria. *New Nigeria*. 8(20),12
12. SMCC (1972). *Inadvertent climate modification*. London, M.I.T. Press
13. Toirce, Y.M. (1984) *Relationship of drought in Africa to anomalies in global circulation*. *World Climate Research Programme*. 4